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This scientist is the lizard king, and he just found another one from the age of dinosaurs

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Philadelphia — Aaron Bauer has traveled the world in search of lizards, logging more than 2 million miles in his quest to identify new species and determine how they fit into the tree of life. He has made more than 100 trips to southern Africa alone.

But when the pandemic restricted his travels, he pivoted to a type of journey he could make while staying in his lab at Villanova University: going back in time.

That's how Bauer and an international group of collaborators made a rare find this winter, identifying a new species of lizard that had been trapped in amber 110 million years ago.

The scientists were sent CT scans of the chunk of golden mineral, found in a mine in Myanmar. Sitting in front of their computer screens around the world, they could see that the animal within was remarkably well-preserved, its delicate bones and scales still intact. They could even make out its windpipe, some muscles and one eyelid.

What's more, the extinct lizard bore an uncanny resemblance to modern reptiles called night lizards, which are found only in the Southwestern United States, Mexico and Cuba — a world away from their ancient cousin. The find offers new insight into how continents have drifted over the ages, and how the happenstance of evolution yielded a body plan that has endured a wide range of changing climates.

Scientists who were not involved with the research, published in Scientific Reports, are gushing.

"A phenomenal find," said Lee Grismer, a herpetologist at La Sierra University in Riverside, California.

"Amazing," said Ned Gilmore, vertebrate zoology collection manager at the Academy of Natural Sciences of Drexel University in Philadelphia.

The new lizard is one of more than 230 reptile species Bauer has helped to identify, more than any living scientist, according to an online registry called the Reptile Database. Most are from the modern era, so Bauer's contribution to the new study, led by paleontologist Susan E. Evans at University College London, was outside his usual range.

But lizards are lizards, and when this one walked the earth, it had evolved an array of bodily features that remain in its apparent cousins of today. It likely lived inside logs or underneath leaf litter, nimbly hiding from predators as it darted about in search of food, Bauer said.

Small and mighty

Why lizards? He's glad you asked.

While public attention may favor the big dinosaurs of yore and larger animals of today, the story of life is populated mostly by smaller beings. Insects are the most abundant, but also plentiful are crustaceans, birds, fish and the scaly creatures of Bauer's world.

"The world is not dominated by elephants and dinosaurs," he said. "It's always been dominated by small animals. This is our view into this world."

Growing up on Long Island, Bauer was that rare child who, when asked what he wanted to be when he grew up, actually knew, and made it happen.

His grandfather was the caretaker of a big estate, so he could spend countless hours in meadows and ponds, catching snakes, turtles, frogs and salamanders. And his family took him often to the American Museum of Natural History in nearby New York City.

He says by age 6, he knew that herpetology — the study of reptiles and amphibians — was his thing.

"No one ever said, 'That's not practical' or 'You can't make a living doing that,' and I forged ahead," he recalled.

But no lizards are native to Long Island, so he became drawn to that group of reptiles because "you always want what you can't have," he said. He studied biology at Michigan State University and earned a Ph.D. at the University of California, Berkeley, by then embarking on his first trips to find lizards in the Southern Hemisphere.

The problem with Geico's gecko

Bauer has been at Villanova since 1988, developing a particular expertise in geckos. He has testified as an expert witness when certain rare geckos are smuggled in the illegal pet

trade.

The Cockney-accented one depicted in the Geico car insurance commercials is wrong on at least two counts, by the way. That type of gecko is not native to England, and unlike the one on TV, it does not blink.

“Still bothers me every time I see it,” Bauer says.

After more than three decades of field trips and publications, he started to notice he was identifying more new reptiles than anyone else. As a joke, someone once taped a sign to the door of his laboratory with the words "lizard king."

But the sheer number of species is not the point. Bauer’s goal is to characterize the richness of biodiversity. Lizards are the most diverse group of reptiles, and geckos, which account for most of the new species he has identified, are an especially diverse group of lizards.

“If you don’t have a name on something, you can’t protect it,” he said. “You can’t communicate about it with other scientists.”

And if you don’t identify something, there is no way to know when it’s gone. That’s what makes the new lizard find such a stroke of luck. The vast majority of life on Earth disappears with no trace in the fossil record. That’s especially true of lizards, as their small frames do not preserve well in hard rock.

A stroke of luck

But 110 million years ago, this lizard became stuck in a glob of sticky tree resin at just the right moment. And apparently few microorganisms were trapped along with it, as the lizard’s skin and even some muscle remained intact as the resin hardened into amber.

The team of scientists dubbed it Retinosaurus hkamtiensis, meaning “resin lizard from Hkamti,” the site of the Myanmar mine where it was found.

Some mines in the Southeast Asian country are under the control of the military dictatorship, and the trade in amber from those locations, driven by private collectors, is considered unethical. But the chunk of amber with the lizard came from a mine outside the conflict zone, found by Nyi Nyi Aung, a local geoscientist.

Working with the Swiss gemologist Adolph Peretti, he invited Bauer and other lizard experts to see the specimen at an office in Bangkok, Thailand, in November 2019. Peering through the golden mineral, they could tell the fossil inside was a rare find. But the real work came later, after team members subjected the specimen to CT scans — including an

ultra-high-resolution set of images captured with a device called a synchrotron, in Melbourne, Australia.

Then came COVID-19. Yet it turned out to be the ideal pandemic project, as team members could share the images and perform the detailed measurements and other analyses required to describe a new species for publication. Analysis of other specimens from the mine is still in progress.

Among other team members were two of Bauer's former Villanova lab members, Edward L. Stanley, now at the Florida Museum of Natural History, and Juan Daza, an associate professor of biology at Sam Houston State University in Huntsville, Texas.

Though Myanmar is in the Northern Hemisphere, geologic evidence suggests that when this lizard was alive, the landmass was part of a group of islands that had broken off from a "super continent" in the Southern Hemisphere, called Gondwana, Daza said. (That's where India came from, too, drifting northward toward a slow-motion collision that would create the Himalayas.)

The discovery of the lizard will help piece together the story of how reptiles spread across the globe, and why some branches of the family tree died out while others — such as this lizard's apparent cousins in Cuba and the U.S. Southwest — have persisted. Those modern creatures are called night lizards because they are mainly active at night or in twilight.

There's no telling what time of day the ancient lizard preferred, but it has the same telltale characteristics as its modern relatives: large scales on the head, tiny scales on the body and a wide, distinctively shaped snout.

And before anyone gets ideas about Jurassic Park-style extraction of the lizard's DNA — sorry, but no. Contrary to what's shown in the movies, genetic material does not preserve well in amber over millions of years.

But to Bauer's surprise, one eyelid survived just fine. Modern lizards may dominate his research, yet he saw a clear connection with this creature from the distant past.

"It's a cool thing," he said, "to be looking in the eye of something that lived that long ago."